CLAIMS

1. A pinion shaft formed using a non-refined steel as a material, comprising:

a shaft section; and a pinion teeth forming section connecting with the shaft section,

the pinion teeth forming section comprising pinion teeth and a tooth bottom,

the pinion teeth forming section and the shaft section being provided with a hardened layer that has been subjected to high frequency quenching and tempering,

the steel containing 0.45 to 0.55 % by mass of C, 0.10 to 0.50 % by mass of Si, 0.15 to 0.25 % by mass of Mo, and 0.0005 to 0.005 % by mass of B, and

surface hardnesses of the pinion teeth forming section and the shaft section being 650 to 760 HV in terms of Vickers hardness.

2. The pinion shaft according to claim 1, wherein the steel further contains 0.5 to 1.2 % by mass of Mn.

3. The pinion shaft according to claim 2, wherein the steel further contains at least one type selected from not more than 0.5 % by mass of Cr, not more than 0.5 % by mass of Cu, and not more

than 0.5 % by mass of Ni.

4. The pinion shaft according to claim 3, wherein the steel further contains not more than 0.025 % by mass of P, not more than 0.025 % by mass of S, 0.005 to 0.10 % by mass of Ti, and not more than 0.015 % by mass of N, and satisfies following equations 1 and 2, respectively representing the contents (% by mass) of C, Si, Mn, Cr, Mo, Cu, Ni, and Cr by a(C), a(Si), a(Mn), a(Cr), a(Mo), a(Cu), a(Ni), and a(Cr), the residual being composed of Fe and inevitable impurities.

Equation 1 ・・・ $0.80 \leqq Ceq \leqq 0.95$

where $Ceq = a(C) + 0.07 \times a(Si) + 0.16 \times a(Mn) + 0.20 \times a(Cr) + 0.72 \times a(Mo)$

Equation 2 ・・・ f value $\leqq 1.0$

where f value $= 2.78 - 3.2 \times a(C) + 0.05 \times a(Si) - 0.60 \times a(Mn) - 0.55 \times a(Cu) - 0.80 \times a(Ni) - 0.75 \times a(Cr)$

5. The pinion shaft according to claim 1, wherein Vickers hardnesses of the pinion teeth forming section and the shaft section in a portion deeper than the hardened layer are 260 to 300 HV.

6. The pinion shaft according to claim 1, wherein a ratio D/R of an effective case depth D at which the hardness in the tooth bottom is not

more than 450 HV in terms of Vickers hardness to a radius R of the tooth bottom is in a range of 0.1 to 0.5.

7. The pinion shaft according to claim 1, wherein a ratio D/R of an effective case depth D at which the hardness in the tooth bottom is not less than 450 HV in terms of Vickers hardness to a radius R of the tooth bottom is in a range of 0.2 to 0.4.

8. The pinion shaft according to claim 1, wherein a ratio d/r of an effective case depth d at which the hardness in the shaft section is not less than 450 HV in terms of Vickers hardness to a radius r of the shaft section is in a range of 0.05 to 0.6.

9. The pinion shaft according to claim 1, wherein a ratio d/r of an effective case depth d at which the hardness in the shaft section is not less than 450 HV in terms of Vickers hardness to a radius r of the shaft section is in a range of 0.35 to 0.5.